ABSTRACT

A scanned, pulsed, focused laser irradiation apparatus can measure and image the photocurrent collection resulting from a dose-rate equivalent exposure to infrared laser light across an entire silicon die. Comparisons of dose-rate response images or time-delay images from before, during, and after accelerated aging of a device, or from periodic sampling of devices from fielded operational systems allows precise identification of those specific age-affected circuit structures within a device that merit further quantitative analysis with targeted materials or electrical testing techniques. Another embodiment of the invention comprises a broad-beam, dose rate-equivalent exposure apparatus. The broad-beam laser irradiation apparatus can determine if aging has affected the device's overall functionality. This embodiment can be combined with the synchronized introduction of external electrical transients into a device under test to simulate the electrical effects of the surrounding circuitry's response to a radiation exposure.